Astro-Venture Career Fact Sheet

Astrophysicist

Related Job Titles:

Space scientist, astronomer, research scientist, physicist, planetary scientist, space physicist, dynamicist, planetary spectroscopist, galactic astronomer, stellar spectroscopist

Job Description:

Astrophysicists study objects in the universe including galaxies, stars, planets, moons, asteroids, meteoroids and comets to understand what they are made of, their surface features, their histories and how they were formed. To study these bodies, astrophysicists often come up with new tools and ways to investigate them. Astrophysicists spend most of their time in laboratories and offices looking at a lot of information gathered by instruments such as telescopes, sensors and probes, deciding what the information means and writing papers and reports about what they find. Some also spend time discovering rules about how objects in space are formed or structured. A small portion of an astrophysicist's time is spent actually making observations with instruments. This may require travel to faraway locations and is done at night.

Interests / Abilities:

- Do you enjoy math and science?
- Do you have a good imagination?
- Do you work well on your own?
- Do you enjoy working with computers?
- Do you enjoy solving mysteries or problems?
- Do you enjoy learning about new things?
- Do you do well in math and science?

Suggested School Subjects / Courses:

- physics
- chemistry
- astronomy
- electronics
- mathematics

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in **physics**, mathematics, **astrophysics**, **astronomy** or a related subject from an accredited **college** or **university**. This study must include one **physics**, or **engineering** lab in aerospace instrumentation. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Solar studies***: study the Sun
- ***Stellar studies***: study the Sun and other **stars**.
- ***Planetary studies***: study **planets**, **moons**, **asteroids**, **meteoroids** and **comets**
- ***Optical physics***: design and develop instruments that measure radiation
- ***Atmospheres and ionospheres***: study atmospheres on Earth, other **planets** and **moons**.
- ***Fields and particles***: study magnetic, gravitational and electric fields in space

Additional Resources:

- NASA Career/ Astronomy Web sites
- Astrobiology Web sites
- SETI Institute Online
  (Search for Extraterrestrial Intelligence)
  http://www.seti.org
- American Institute of Physics
  http://www.aip.org
- The American Physical Society
  http://www.aps.org
- American Astronomical Society
  (request a pamphlet with information on careers in astronomy)
  http://www.aas.org
- Yvonne Pendleton's Astronomy Web site for students
  (Yvonne is a NASA astrophysicist)
  http://web99.arc.nasa.gov/~yvonne
- The Planetary Society
  http://www.planetary.org
- Astronomical society of the Pacific
  http://www.aspsky.org

What can I do right now?

- Visit Astro-Venture regularly to participate in chats and activities.
- Visit a planetarium or observatory near you.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit (202) 783-7200.
- Join an astronomy club.
- Buy an inexpensive telescope and study the stars from home.
- Read Astronomy and Sky and Telescope magazines.
- Ask your teacher to sign up for Astro, a program where astronomers visit your classroom.
- Attend U.S. Space Camp for a week-long program on astronomy and space sciences.

Career Fact Sheet

Physical Science Technician

Related Job Titles:

Biological technician, chemical technician, environmental technician, engineering technician

Job Description:

Technicians help scientists and **engineers** with their products and experiments. They set up and run **laboratory** instruments. When there are problems with the instruments, technicians fix them. They also check and track experiments, make **observations** of the experiments, record results and often make conclusions. Technicians gather data from various sources such as field notes, design books and lab reports, look at the data and report any errors or data that don't fit with the rest. Science technicians usually work regular hours and, depending on their area of study, may work in a laboratory or outdoors. They spend a lot of time on the computer.

Interests / Abilities:

- Are you good at solving problems?
- Do you like to use computers?
- Do you express yourself well when you speak and write?
- Do you work well with others?
- Do you like to do science experiments?

Suggested School Subjects / Courses:

- Science (with laboratory activities)
- Math
- Computers

Education / Training Needed:

At least two years of specialized training in science or science-related technology is required to be a technician. This training may be earned at a **technical institute**, **vocational school** or from a **community college** or **junior college** or from work experience. It is helpful to have some experience from internships or summer jobs in laboratories.

Areas of expertise:

- ***Biology*** : assist scientists in studying living things, **viruses**, **microbes**, **DNA**
- ***Chemistry*** : assist scientists to develop, use and study **chemicals**
- ***Engineering*** : assist scientists and **engineers** with instruments

Additional Resources:

- NASA Office of Space Science
  http://www.hq.nasa.gov/office/oss/
- NASA Jobs
  http://nasajobs.nasa.gov/
- NASA Quest
  http://quest.nasa.gov
- Spacelink Career links
  http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Careers/.index.html
- Order NASA career videos such as "Winning Aerospace the Next Decade" or "Preparing Today for Tomorrow" and posters such as "Superstars of Modern Aeronautics" and "Superstars from Spaceflight" from NASA CORE
  http://core.nasa.gov
- American Chemical Society
  http://www.acs.org
- Jobs with the Federal Government
  http://www.usajobs.opm.gov

What can I do right now?

- Take as many math and science classes as you can.
- Participate in science fair projects.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200

Astro-Venture Career Fact Sheet

Astrobiologist

Related Job Titles:

Exobiologist, life scientist, space scientist

Job Description:

Astrobiologists study life in the **universe**: how it began, where it's located and how it has evolved or changed over time. Three main questions drive their research: How did life begin and evolve? Is there life elsewhere in the **universe**? What is the future for life on Earth and beyond? Astrobiologists need to understand how many different kinds of science work together. These kinds of science may include **biology** (**microbiology**, **botany**, **physiology**, **zoology**), **chemistry**, **physics**, **geology**, **paleontology** and **astronomy**. Some astrobiologists spend time writing proposals to ask for funding for their research. They usually work regular hours in laboratories and use **microscopes**, computers and other equipment. Some use plants and animals for experiments. Many do research outside, and many work with a team.

Interests / Abilities:

- Do you enjoy doing experiments?
- Are you interested in how animals and plants function?
- Are you curious about whether there is other life in the **universe**?
- Do you work well on your own?
- Do you work well with a team?
- Do you enjoy investigating mysteries or problems?

Suggested School Subjects / Courses:

- Science (**biology**, **chemistry**, **physics**, **astronomy**, **planetary science** with **laboratory** research and **fieldwork**)
- Math

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in **biology**, **astronomy**, **space science**, **chemistry** or another appropriate subject from an accredited **college** or **university**. This course of study must include at least 20 semester hours of **physical science** or **engineering** or experience that leads to the understanding of the equipment used for manned aerospace flights. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Chemical and biological evolution***: study what life is, where it's located, how it began and changed over time
- ***Biogeochemistry***: study rocks for evidence of life
- ***Microbiology***: study microscopic organisms and the conditions of the environments where they can survive (especially very hot/cold environments)
- ***Solar system analysis***: research and design new experiments and instruments to explore the **solar system**

Additional Resources:

- NASA Office of Space Science
  http://www.hq.nasa.gov/office/oss
- NASA Office of Life and Microgravity Sciences and Applications http://www.hq.nasa.gov/office/olmsa
- Astrobiology at NASA
  http://astrobiology.arc.nasa.gov
- The Astrobiology Web
  http://www.astrobiology.com
- NASA Specialized Center of Research and Training (NSCORT) / Exobiology
  http://exobio.ucsd.edu
- American Institute of Biological Sciences
  http://www.aibs.org
- American Physiological Society
  http://www.faseb.org/aps
- Biotechnology Industry Organization
  http://www.bio.org/welcome.html
- Biophysical Society
  http://www.biophysics.org/biophys/society/biohome.htm

What can I do right now?

- Join a local environmental club or organization.
- Participate in Earth Day activities.
- Take summer jobs or internships at parks, farms, plant nurseries, laboratories, museums or camps.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Participate in science fair projects.

NASA

Career Fact Sheet

Biologist

Related Job Titles:

Life scientist, medical scientist, biomedical engineer, biological scientist, psychologist

Job Description:

Biologists study living things and their relationship to their environment. Most biologists work in research and development. Some work on basic research to learn more about living things such as **bacteria** and **viruses**. Some work on applied research which uses basic research to come up with new medicines, ways to make plants grow better or ways to protect the environment. At NASA, life scientists often research how space environments affect living things, how to support life in space and how life began and changed over time. Some biologists spend time writing proposals to ask for funding for their research. They usually work regular hours in laboratories and use **microscopes**, computers and other equipment. Some use plants and animals for experiments. Many do research outside, and many work with a team.

Interests / Abilities:

- Do you enjoy science?
- Do you enjoy doing experiments?
- Are you interested in how animals and plants function?
- Do you work well on your own?
- Do you work well with a team?
- Do you enjoy solving mysteries or problems?

Suggested School Subjects / Courses:

- Science (**biology**, **chemistry**, **physics** and **biochemistry** with **laboratory** research and **fieldwork**)
- Math

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in **biology** or other appropriate field of life science from an accredited **college** or **university**. This course of study must include at least 20 semester hours of **physical science** or **engineering** or experience that leads to the understanding of the equipment used for manned aerospace flights. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Chemical and biological evolution***: study what life is, where it's located, and how it began and changed over time
- ***Life support***: research, develop and test life support equipment for aerospace flight
- ***Microbiology***: study animals or plants so small, they can only be seen through a **microscope**
- ***Biochemistry***: study the **chemicals** that living things are made of
- ***Physiology***: study how plants and animals function including growth, **reproduction**, **photosynthesis**, **respiration**, movement and how these are affected by space environments
- ***Neurobiology***: study the **nervous system** of living things and how it is affected by space environments

Additional Resources:

- NASA Office of Life and Microgravity Sciences and Applications
  http://www.hq.nasa.gov/office/olmsa/
- American Institute of Biological Sciences
  http://www.aibs.org
- American Physiological Society
  http://www.faseb.org/aps
- Biotechnology Industry Organization
  http://www.bio.org/welcome.html
- American Society for Biochemistry and Molecular Biology
  http://www.biophysics.org/biophys/society/biohome.htm
- American Society for Microbiology
  http://www.asmusa.org

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- Participate in Earth Day activities.
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- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Participate in science fair projects.

Career Fact Sheet

Computer Scientist

Related Job Titles:

Systems analyst, computer engineer, software engineer, software developer, database administrator, computer support specialist, network engineer, hardware engineer, network administrator, systems administrator, database specialist, communications specialist

Job Description:

Computer scientists design and develop new computer **hardware** and **software**. They research, form new computer rules and invent new products such as robots that use virtual reality, new computer languages, programming tools or even computer games. They normally work in offices or laboratories and spend most of their time on the computer.

Interests / Abilities:

- Do you enjoy working with math and technology?
- Are you good at math?
- Are you good at reasoning and logic?
- Do you like to solve problems?
- Do you work well with a team?
- Do you pay close attention to details?
- Do you express yourself well when speaking to others?

Suggested School Subjects / Courses:

- Math
- Science (**physics**)
- Computer programming

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in computer science, computer **engineering**, **electrical engineering**, information science, computer information systems, data processing or a similar subject from an accredited **college** or **university**. This study must include 30 semester hours of differential and integral **calculus**, statistical techniques and computer science theory and practical applications. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Computer engineering***: use math and science to design **hardware**, **software**, **networks** and processes to solve technical problems such as analyzing flight systems and aerospace data
- ***Applications programming***: design and develop **software** that control and automate processes such as flight **software**
- ***Communications***: install, test and solve problems for **hardware** and **software** on a **network**
- ***Systems analysis***: use computer technology to solve specific business, scientific or **engineering** problems
- ***Database administration***: design, change, test and manage the security of computer **databases**
- ***Computer support***: assist and advise computer users with **hardware**, **software** and system problems

Additional Resources:

- NASA Jobs
  http://nasajobs.nasa.gov
- Association for Computing (ACM)
  http://www.acm.org
- IEEE Computer Society
  http://www.computer.org
- Institute for Certification of Computing Professionals (ICCP)
  http://www.iccp.org
- Robotics Education
  http://robotics.arc.nasa.gov
- ThinkQuest - encourages the use of computers and network technology in education.
  http://www.thinkquest.org

What can I do right now?

- Read magazines like *MacWorld, Byte, PC World.*
- Join a computer club.
- Take as many math and computer classes as you can.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Participate in science fair projects.

Career Fact Sheet

Computer Specialist

Related Job Titles:

Systems programmer, applications programmer, computer programmer, systems administrator

Job Description:

Computer specialists write, test and manage computer programs (detailed instructions for computers). They break down each computer task into a series of steps the computer can follow. They then use a computer language to write these instructions. After writing the program, they test it to make sure the computer follows the steps correctly and they fix any problems they find. Computer programmers work in offices and spend most of their time on the computer.

Interests / Abilities:

- Do you enjoy working with math and technology?
- Are you good at reasoning and logic?
- Do you pay close attention to details?
- Do you keep working at a problem until you find a solution?
- Do you work well under pressure?
- Are you imaginative and creative?

Suggested School Subjects / Courses:

- Math
- Science (**physics**)
- Computer programming

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in computer science, information science, mathematics, **engineering**, **physical science** or a similar subject from an accredited **college** or **university**. It is helpful to have experience with computers from internships or summer jobs. Since computer science changes quickly, all computer programmers must keep their skills up-to-date by seeking training throughout their career.

Areas of Expertise:

- ***Applications programming***: write **software** to handle specific jobs in an organization or business
- ***Systems programming***: manage the use of computer systems **software** so that communication on a **network** works smoothly

Additional Resources:

- NASA Jobs
  http://nasajobs.nasa.gov
- Order NASA career videos such as "Journey into Cyberspace," "Space for Women" or "Where Dreams Come True" from NASA CORE.
  http://core.nasa.gov
- Association for Computing (ACM)
  http://www.acm.org
- IEEE Computer Society
  http://www.computer.org
- Institute for Certification of Computing Professionals (ICCP)
  http://www.iccp.org
- Robotics Education
  http://robotics.arc.nasa.gov
- Jobs with the Federal Government
  http://www.usajobs.opm.gov

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  (202) 783-7200
- Participate in science fair projects.

Astro-Venture Career Fact Sheet

Engineer

Related Job Titles:

Electrical engineer, electronics engineer, mechanical engineer, aerospace engineer, chemical engineer, materials engineer, computer engineer

Job Description:

Engineers design, develop and test products, machinery, factories and systems such as buildings, robots, instruments, spacecraft, airplanes, motors and other equipment. When designing a new product, **engineers** first figure out what it needs to do. They then design and test the parts, fit the parts together and test to see how successful it is. They also write reports on the product. Most **engineers** work in office buildings or laboratories. Some work outdoors at construction sites. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Do you like to take things apart and put them back together?

Suggested School Subjects / Courses:

- Mathematics (**algebra**, **geometry**, **trigonometry**, **calculus**)
- Science (**physics**, **biology**, **chemistry**,)
- English (writing)
- Social studies (history)
- Computer programming
- **Engineering**

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in **engineering** from an accredited **college** or **university**. **Engineering** degrees are generally offered in electrical, mechanical, aerospace or civil **engineering**. To do research, a **Ph.D.** is highly desired for this position.

Areas of Expertise:

- ***Electronics***: design and lead the production of electrical and electronic equipment such as motors, wiring, aircraft, radar and computers
- ***Aerospace***: design, test and lead the building of missile, spacecraft and aircraft
- ***Chemistry***: use chemistry and engineering to solve problems in producing or using chemicals and to design equipment for producing chemicals
- ***Mechanics***: plan and design tools, engines, machines and other equipment such as jet and rocket engines and robots
- ***Computers***: design and develop computers or robots
- ***Materials***: develop and test new types of materials for aerospace systems and vehicles

Additional Resources:

- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE.
  http://core.nasa.gov
- Robotics Education
  http://robotics.arc.nasa.gov
- Junior Engineering Technical Society
  http://www.asee.org/jets
- Accreditation Board for Engineering and Technology, Inc.
  http://www.abet.org
- American Institute of Aeronautics and Astronautics
  http://www.aiaa.org
- Institute of Electrical and Electronics Engineers
  http://www.ieee.org

What can I do right now?

- Participate in Bot-Ball or FIRST Robotics competitions (see Robotics Education http://robotics.arc.nasa.gov).
- Take as many math and science classes as you can.
- Participate in science fair projects.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Order activity books, poster sets and **engineering** kits by writing to the Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, MI 48121-0930.
- Participate in National Engineers Week.

Career Fact Sheet

Aerospace Engineer

Related Job Titles:

Fluid dynamicist, mechanical engineer

Job Description:

Aerospace **engineers** design, develop, test and oversee the building of aircraft, spacecraft, propulsion systems and space flight mission paths. When designing a new product, **engineers** first figure out what it needs to do. They then design and test the parts, fit the parts together and test to see how successful it is. They also write reports on the product. Most **engineers** work in office buildings or laboratories. Some work outdoors at construction sites. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Do you like to take things apart and put them back together?

Suggested School Subjects / Courses:

- Mathematics (**trigonometry**, **calculus**)
- Science (**physics**, **chemistry**,)
- Computer programming
- **Engineering** (**fluid dynamics**, **aerodynamics**, **thermodynamics**, propulsion dynamics, mechanical)

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in aerospace **engineering** or a related subject from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Aerodynamics***: design aerospace craft with the best air flow
- ***Structures***: design and build new constructions such as a space station
- ***Propulsion***: design and develop systems that drives or propels an aerospace craft
- ***Astrodynamics***: design spacecraft that can move and function in a space environment

Additional Resources:

- Careers in Aviation/Aerodynamics
  http://wings.ucdavis.edu/Careers/index.html
- Take Off!
  http://www.mcet.edu/nasa/index.html
- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE.
  http://core.nasa.gov
- Robotics Education
  http://robotics.arc.nasa.gov
- Junior Engineering Technical Society
  http://www.asee.org/jets
- Accreditation Board for Engineering and Technology, Inc.
  http://www.abet.org

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- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Order activity books, poster sets and **engineering** kits by writing to the Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, MI 48121-0930.

Career Fact Sheet

Chemical Engineer

Related Job Titles:

Organic chemist, polymer chemist, thermodynamicist, fluid dynamicist, materials engineer

Job Description:

Chemical **engineers** use **chemistry**, **engineering** and **physics** to develop chemical products such as propulsion gases. When designing a new product, **engineers** first figure out what it needs to do. They then design and test the product. They also write reports on the product. Most **engineers** work in office buildings or laboratories. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Are you creative?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Are you good at working with a team?

Suggested School Subjects / Courses:

- Mathematics (**algebra**, **geometry**, **trigonometry**, **pre-calculus**, **calculus**)
- Science (**physics**, **biology**, **chemistry**)
- **Engineering** (**thermodynamics**, **fluid mechanics**)
- Computer programming
- Social studies (history)
- English (writing)

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in chemical **engineering** or a related subject from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of Expertise:

- ***Manufacturing***: design and update machines such as airplanes, robots, cars, etc.
- ***Fluids***: design and build fluid flow systems or processes such as pipes
- ***Biomedical***: design and develop instruments, such as a heart pump, for medical use
- ***Systems***: design and analyze mechanical or heating systems

Additional Resources:

- NASA Jobs
  http://nasajobs.nasa.gov
- Junior Engineering Technical Society
  http://www.asee.org/jets
- Accreditation Board for Engineering and Technology, Inc.
  http://www.abet.org
- American Chemical Society
  http://www.acs.org
- American Institute of Chemical Engineers
  http://www.aiche.org
- Chemical Engineers' Resource Page
  http://www.cheresources.com/indexzz.shtml
- History of Chemical Engineering & Chemical Technology
  http://www3.cems.umn.edu/~aiche_ug/history/h_intro.html

What can I do right now?

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- Participate in National Engineers Week.
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Career Fact Sheet

Computer Engineer

Related Job Titles:

Computer **hardware** engineer, electronics engineer, computer scientist

Job Description:

Computer **engineers** design and develop computers or robots. When designing a new product, **engineers** first figure out what it needs to do. They then design and test the parts, fit the parts together and test to see how successful it is. They also write reports on the product. Most **engineers** work in office buildings or laboratories. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Are you creative?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Are you good at working with a team?

Suggested School Subjects / Courses:

- Mathematics
- Science (**physics**)
- **Engineering** (**computer electronics**, electrical, mechanical, **systems engineering**)
- Computers programming
- Social studies (history)
- English (writing)

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in computer **engineering** or a related subject from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of Expertise:

- ***Computer hardware***: design and develop computer equipment
- ***Robotics***: design and develop robots

Additional Resources:

- IEEE Computer Society
  http://www.computer.org
- Institute for Certification of Computing Professionals (ICCP)
  http://www.iccp.org
- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE.
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- Robotics Education
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- Junior Engineering Technical Society
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- Accreditation Board for Engineering and Technology, Inc.

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Career Fact Sheet

Electronics Engineer

Related Job Titles:

Electrical engineer, computer engineer, computer scientist

Job Description:

Electronics engineers design, develop, test and lead the production of electrical and electronic equipment including scientific instruments, motors, wiring in buildings, aircraft, radar, computers, robots and video equipment. Most **engineers** work in office buildings or laboratories. Some work outdoors at construction sites. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Do you like to take things apart and put them back together?

Suggested School Subjects / Courses:

- Mathematics (**algebra**, **geometry**, **trigonometry**, **calculus**)
- Science (**physics**, **biology**, **chemistry**)
- Computers
- **Engineering** (**thermodynamics**, **fluid dynamics**, mechanical, **electronics**)

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in electrical or **electronics engineering** from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of Expertise:

- ***Sensors and transducers***: research and develop sensing devices such as lasers that are needed in **aerospace** research.
- ***Electronic instrumentation***: research and develop equipment that can detect, record and measure data for **aerospace** research.
- ***Guidance and navigation systems***: research and develop systems used to guide and **navigate aerospace** vehicles and spacecraft.
- ***Electromagnetic systems***: research and develop instruments, such as antenna systems, that measure electromagnetics.
- ***Tracking and telemetry systems***: research and develop systems and devices that track the flight of **aerospace** vehicles or that transmit and receive data and commands between space vehicles and the ground.
- ***Computer design***: design and develop computers or robots.

Additional Resources:

- Careers in Aviation/Aerodynamics
  http://wings.ucdavis.edu/Careers/index.html
- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE.
  http://core.nasa.gov
- Robotics Education
  http://robotics.arc.nasa.gov
- Junior Engineering Technical Society
  http://www.asee.org/jets
- Accreditation Board for Engineering and Technology, Inc.
  http://www.abet.org
- Institute of Electrical and Electronics Engineers
  http://www.ieee.org

What can I do right now?

- Participate in Bot-Ball or Robotics First competitions (see Robotics Education http://robotics.arc.nasa.gov/).
- Take as many math and science classes as you can.
- Participate in National Engineers Week.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit (202) 783-7200.
- Order activity books, poster sets and **engineering** kits by writing to the Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, MI 48121-0930.

Career Fact Sheet

Engineering Technician

Related Job Titles:

Physical science technician, data technician, engineering aid, **aerospace** engineering technician, architecture technician, biomedical technician, chemical engineering technician, civil engineering technician, electrical engineering technician, materials engineering technician

Job Description:

Engineering technicians use science, math and **engineering** to solve technical problems. Most assist **engineers** and scientists by setting up or installing equipment, testing, maintaining and repairing equipment, conducting experiments, recording results, writing design plans and running tests. Technicians also gather data from various sources such as field notes, design books and lab reports, look at the data and report any errors or data that do not fit with the rest. **Engineering** technicians usually work in a **laboratory**, office or construction site. They spend a lot of time on the computer recording data, writing reports and writing design plans.

Interests / Abilities:

- Do you enjoy math and science?
- Are you good at math?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Are you good at working with a team?
- Do you express yourself well when writing?

Suggested School Subjects / Courses:

- Mathematics (**algebra**, **trigonometry**)
- Science
- Computers

Education / Training Needed:

At least two years of specialized training in computer **hardware** or **engineering** technology is required to be a technician. This training may be earned at an **institute**, **vocational school**, **community** or **junior college,** or from work experience. It is helpful to have some experience from internships or summer jobs in laboratories.

Areas of expertise:

- ***Electronics***: help design and lead the production of electrical and electronic equipment such as radar, sonar, navigation equipment and other instruments
- ***Engineering drafting***: use **graphics** to show designs of products before they are built
- ***Construction***: oversee the construction or repair of structures or facilities
- ***Cartography***: create and edit maps and charts.
- ***Equipment***: test and maintain equipment

Additional Resources:

- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE.
  http://core.nasa.gov
- Robotics Education
  http://robotics.arc.nasa.gov
- Junior Engineering Technical Society
  http://www.asee.org/jets
- Accreditation Board for Engineering and Technology, Inc.
  http://www.abet.org
- American Institute of Aeronautics and Astronautics
  http://www.aiaa.org
- Institute of Electrical and Electronics Engineers
  http://www.ieee.org

What can I do right now?

- Participate in Bot-Ball or FIRST Robotics competitions (see Robotics Education http://robotics.arc.nasa.gov).
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Career Fact Sheet

Materials Engineer

Related Job Titles:

Metallurgical engineer, ceramics engineer

Job Description:

A materials **engineer** develops and tests new types of metallic and non-metallic materials (**ceramics**, plastics, and composites) for use in **aerospace** systems and vehicles. When making a new material, **engineers** select materials with the structure and features needed for a given purpose. For example, they might develop lightweight, strong, heat-resistant materials for use in space. Most **engineers** work in laboratories. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Are you creative?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Are you good at working with a team?

Suggested School Subjects / Courses:

- Mathematics
- Science (**physics**, **chemistry**,)
- **Engineering** (materials)

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in materials **engineering** or a related subject from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Ceramics***: develop new ceramic materials
- ***Metallurgy***: study and develop new metals by combining different metals

Additional Resources:

- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE
  http://core.nasa.gov
- Robotics Education
  http://robotics.arc.nasa.gov
- Junior Engineering Technical Society
  http://www.asee.org/jets
- Accreditation Board for Engineering and Technology, Inc.
  http://www.abet.org
- American Institute of Aeronautics and Astronautics
  http://www.aiaa.org
- Institute of Electrical and Electronics Engineers
  http://www.ieee.org

What can I do right now?

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Career Fact Sheet

Mechanical Engineer

Related Job Titles:

Mechanical systems engineer, aerospace engineer, materials engineer

Job Description:

Mechanical **engineers** plan and design engines, machines and other equipment. When designing a new product, **engineers** first figure out what it needs to do. They then design and test the parts, fit the parts together and test to see how successful it is. They also write reports on the product. Most **engineers** work in office buildings or laboratories. Some work outdoors at construction sites. Some must travel to different work sites.

Interests / Abilities:

- Are you good at math?
- Are you creative?
- Is your work detailed?
- Do you like to solve problems?
- Are you interested in how things work?
- Do you like working with computers?
- Are you good at working with a team?

Suggested School Subjects / Courses:

- Mathematics (**algebra**, **geometry**, **trigonometry**, **pre-calculus**, **calculus**)
- Science (**physics**, **biology**, **chemistry**)
- **Engineering** (**thermodynamics**, **fluid mechanics**)
- Computer programming
- Social studies (history)
- English (writing)

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in **mechanical engineering** from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Manufacturing***: design and update machines such as airplanes, robots, cars, etc.
- ***Fluids***: design and build fluid flow systems or processes such as pipes
- ***Biomedical***: design and develop instruments such as a heart pump for medical use
- ***Systems***: design and analyze mechanical or **thermal** systems

Additional Resources:

- Careers in Aviation/Aerodynamics
  http://wings.ucdavis.edu/Careers/index.html
- Order NASA career videos such as "Engineers: Turning Ideas into Reality," "Careers: Aerospace Engineer" or "Reaching for the Stars" from NASA CORE.
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  http://www.abet.org
- American Institute of Aeronautics and Astronautics
  http://www.aiaa.org
- Institute of Electrical and Electronics Engineers
  http://www.ieee.org

What can I do right now?

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Career Fact Sheet

Executive Manager

Related Job Titles:

Director, administrator, deputy, chief

Job Description:

Executive managers are the top leaders of a business or organization. At NASA, an executive manager is the leader of a NASA center or a program office who sets the center or program goals and makes an action plan to lead activities, research, programs and missions. Most work long hours and are required to travel often to other NASA centers and conferences. They may speak or appear at public events.

Interests / Abilities:

- Are you confident?
- Are you good at making decisions?
- Do you have a lot of energy?
- Are you good at leading and persuading people?
- Do you express yourself clearly when speaking?
- Do you work well under pressure?
- Do you work at your goals until you succeed?

Suggested School Subjects / Courses:

- Science
- **Engineering**
- Management
- Public speaking

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** from an accredited **college** or **university**. The qualifications sought in an executive manager include leadership skills in leading change, leading people, producing results, managing resources, communicating and building cooperation with others. Most managers begin as a scientist or **engineer** and are promoted to a management position because of their leadership skills and their broad understanding of science.

Areas of expertise:

- ***Center direction***: lead one of NASA's twelve centers.
- ***Program office direction***: leads a large program such as **Space Science**.

Additional Resources:

- OPM Senior Executive Service (describes the leadership skills necessary for all U.S. government positions in the Senior Executive Service)
  http://www.opm.gov/ses/qualify.html
- NASA Jobs
  http://nasajobs.nasa.gov
- Career Opportunities in Aerospace Technology
  http://www.jsc.nasa.gov/ah/jscjobs/career/page1.htm
- NASA Quest
  http://quest.nasa.gov
- American Management Association, 1601 Broadway, New York, NY 10019-7420
- National Management Association 2210 Arbor Blvd. Dayton, OH 45439

What can I do right now?

- Join a leadership club or camp.
- Participate in student government or leadership of a club.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Participate in science fair projects.
- Research science, **engineering** and computer occupations to decide what area you would like to work in.

Career Fact Sheet

Project Manager

Related Job Titles:

Project Lead, Technical Lead, Principal Investigator

Job Description:

Program managers plan, organize and lead research, development, design and computer activities. Program managers lead other people by dividing tasks, making a schedule, reviewing and assessing their work. They come up with a detailed plan of how to reach the goals of a project and estimate the cost of the project. They present ideas and projects to top management for approval or for funding. Program managers spend most of their time in an office and in meetings. Sometimes they have pressure to meet deadlines.

Interests / Abilities:

- Do you manage your time well?
- Are you good at making decisions?
- Are you organized?
- Are you good at leading and persuading people?
- Do you get along well with others?
- Do you express yourself clearly when speaking?
- Are you good at inspiring or motivating others?

Suggested School Subjects / Courses:

- Science, **engineering** or computer science
- Math
- Speech
- Leadership

Education / Training Needed:

To be a program manager, experience as an engineer, mathematician, scientist or computer professional is essential to understand and guide the type of work managed. The minimum education required for this position is a bachelor's degree from an accredited college or university. A program manager must know NASA's methods and rules of managing projects and gathering resources. Project managers must also be able to organize many activities happening at one time. Most managers begin as a scientist or engineer and are promoted because of their management skills.

Areas of expertise:

- ***Engineering***: lead people who design and develop equipment, products and processes
- ***Science***: lead research and development activities in **chemistry**, **biology**, **geology**, **meteorology** or **physics**
- ***Computer systems***: lead and plan programming and projects that use computers and coordinate development of computer equipment and **software**

Additional Resources:

- NASA Jobs
  http://nasajobs.nasa.gov
- American Management Association,
  1601 Broadway, New York, NY 10019-7420
- National Management Association
  2210 Arbor Blvd. Dayton, OH 45439
- Jobs with the Federal Government
  http://www.usajobs.opm.gov

What can I do right now?

- Join a leadership club or camp.
- Participate in student government or leadership of a club.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Participate in science fair projects.
- Research science, **engineering** and computer occupations to decide what area you would like to work in.

Astro-Venture Career Fact Sheet

Mathematician

Related Job Titles:

Computer scientist, computer programmer

Job Description:

There are two types of mathematicians: theoretical and applied. Theoretical mathematicians come up with new mathematical rules and processes using the latest technology. Applied mathematicians use math rules and processes to solve scientific, **engineering** and business problems. These problems might include studying and designing computer models that help to create faster and higher **aerospace** vehicles and systems. Mathematicians usually work in an office and spend a lot of time on the computer.

Interests / Abilities:

- Do you enjoy working with math and technology?
- Are you good at math?
- Are you good at reasoning and logic?
- Do you like to solve problems?
- Do you work well with a team?
- Do you keep working at a problem until you find a solution?

Suggested School Subjects / Courses:

- Math (**algebra**, **geometry**, statistics, **calculus**)
- Computer science (programming)
- **Engineering**
- Science

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in mathematics from an accredited **college** or **university**. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Modeling***: make simulations to study and improve **aerospace** craft and systems
- ***Data analysis***: study **aerospace** problems and come up with the quickest, easiest method of modeling and solving them
- ***Statistician***: design experiments, gather data, decide what the data means and make predictions

Additional Resources:

- Careers in Aviation/Aerodynamics
  http://wings.ucdavis.edu/Careers/index.html
- Order NASA career videos such as "Journey into Cyberspace," "Winning: Aerospace the Next Decade" or "Where Dreams Come True" from NASA CORE
  http://core.nasa.gov
- American Mathematical Society
  http://www.ams.org
- Mathematical Association of America
  1529 18th St. NW, Washington D.C. 20036
- Society for Industrial and Applied Mathematics,
  3600 University City Science Center,
  Philadelphia, PA 19104-2688

What can I do right now?

- Join a math or computer club.
- Take as many math and computer classes as you can.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit.
  (202) 783-7200
- Participate in science fair projects.

Astro-Venture Career Fact Sheet

Psychologist

Related Job Titles:

Cognitive psychologist, research psychologist

Job Description:

Psychologists study the human mind and behavior. They make predictions and collect data to test their predictions through lab experiments or tests, **observations**, interviews, or questionnaires. They may work at a counseling center, their own office, a hospital, a clinic, **university**, research center, business, non-profit or government organization. NASA psychologists are usually research psychologists who do research and come up with explanations for how people behave or function in **aerospace** environments. These studies may include how well humans can use their senses and make decisions, how the environment affects a human's ability to think and work and how well crew members work together and get along in **aerospace** conditions. Some travel is usually required to attend conferences or conduct research.

Interests / Abilities:

- Are you a good listener?
- Do you enjoy doing research?
- Do you pay close attention to details?
- Do you work well on your own?
- Do you work well with a team?
- Do you express yourself clearly when speaking and writing?

Suggested School Subjects / Courses:

- Science (**biology**, **psychology**)
- Math (statistics)
- Research methods

Education / Training Needed:

The minimum education required for this position is a **bachelor's degree** in behavioral science or other appropriate subject from an accredited **college** or **university**. This course of study must include at least 20 semester hours of **physiology**, experimental physiological **psychology** or other appropriate life science or experience in **biotechnology**, **hardware** or other appropriate life science field. To do research, a **Ph.D.** is highly desired for this position.

Areas of expertise:

- ***Human performance studies***: study how humans behave and function, how the crew works together and how the senses work in **aerospace** environments
- ***Manned systems***: design guidelines for **hardware** and **software** to best meet human needs in **aerospace** environments

Additional Resources:

- NASA Jobs
  http://nasajobs.nasa.gov
- American Psychological Association
  http://www.apa.org
- National Association of School Psychologists
  http://www.naspweb.org
- Jobs with the Federal Government
  http://www.usajobs.opm.gov

What can I do right now?

- Take summer jobs or internships working at an after-school program or club such as the Boys and Girls Club or for summer camps.
- Be a mentor to a younger child.
- If your school has a peer counseling program, sign up.
- Visit Astro-Venture regularly to participate in chats and activities.
- Call the American Association of Science and Technology Centers for information on science museums in your area that you might visit. (202) 783-7200
- Participate in science fair projects .